Heat Stress Monitoring and Use of the WBGT Meter

LG #3

A. Heat Stress Control Program

Heat Stress Control Program

- **When engineering controls cannot control heat stress, the only option is to limit the time personnel can remain in a heat stress environment.**

Heat Stress Control Program

- **Monitoring heat stress must take into consideration:**
  - *Dry Bulb (DB) temperature*
  - *Wet Bulb (WB) temperature-- (humidity)*
  - *Globe temperature (GT)--(radiant heat)*
  - *Level of work being performed at the hot location*

WBGT Index Formula

- **(0.1DB) + (0.7WB) + (0.2GT) = WBGT Index**
- **WBGT Meter automatically calculates the index**

WBGT Index Formula

- **Useful if readings taken by separate thermometers**
- **Useful for validating WBGT Meter readings**
- **Useful if using a Motorized Psychrometer**

B. Use of the WBGT Meter

Reuter-Stokes 220 WBGT Meter

- **Meter consists of:**
  - *Globe thermometer*
  - *Tunnel assembly which houses dry and wet bulb sensor*
  - *2 knobs and liquid crystal display*

Reuter-Stokes 220 WBGT Meter

- **Left knob has four positions**
  - *DB, WB, GT, and WBGT*
- **Right knob has three positions**
  - *OFF, CHECK, and ON*
- **Runs on rechargeable Ni-Cad batteries**
- **Should have METRL calibration sticker**

Vista 960 WBGT Meter

- **Meter consists of:**
  - *Globe thermometer*
  - *Tunnel assembly which houses dry and wet bulb sensor*
  - *2 switches, a knob, and a liquid crystal display*

Vista 960 WBGT Meter

- **Center knob has 10 positions**
  - *DB, WB, GT, WBGT, and P1-P6*
  - *"P" positions provide PHEL chart readings corresponding to curves 1-6 for final WBGT and stay times*

Vista 960 WBGT Meter

- **Left bottom switch is "ON" or "OFF"**
- **Left top switch has 2 positions**
  - *"TEST" (for calibration)*
  - *"RUN" (for readings)*
- **Runs on rechargeable Ni-Cad batteries**
- **Should have METRL calibration sticker**

C. Taking WBGT Meter Readings

Guidelines

- **Take meter readings of heat stress area when conditions meet situations outlined in OPNAVINST 5100.19 (series)**
- **Take dry & wet bulb readings outside (weather decks) before and after each set of readings**

Guidelines

- **Begin readings at work/watch station reporting highest DB temperature or heat stress condition**

- **Allow meter to equalize before beginning (no fluctuations greater or less than 0.1 degree)**

- **Take readings close to the area where the individual works**

Guidelines

- **Hold meter so that any air flow comes into the fan side of the meter**
- **Hold meter chest high and at arm's length from the body**
- **Take readings in the order of the meter knob positions**
- **Check wet bulb sock regularly to ensure it remains wet**

D. Recording Heat Stress Readings

Heat Stress Forms

- **Each ship should stock heat stress forms**
- **Should be similar to those in OPNAVINST 5100.19 (series)**

Heat Stress Forms

- **Should contain spaces for recording:**
  - *WBGT reading for each location surveyed*
  - *Outside readings before and after DB and WB readings*
  - *PHEL chart readings for the desired PHEL curves*
  - *Comments during routing*

Heat Stress Forms

- **Results must be routed through the chain of command for the cognizant area**
- **If stay times are less than the work or watch times, walk results to CO or CDO**
- **Leave copy of results with supervisor, if possible**
- **Provide other information (engine RPM, sea water injection temperature, steam leaks, etc.)**

E. Using the Physiological Heat Exposure Limit (PHEL) Chart

The PHEL Chart

- **Was developed to account for how hard an individual is working in a heat stress area**
- **Curves are numbered I, II, III, IV, V, and VI**
  - *Lowest level of work is curve I*
  - *Most strenuous level of work is curve VI*
- **General PHEL Curve Applicability Table in OPNAVINST 5100.19 (series) lists curves for routine operations and casualty control drills**

The PHEL Chart

- **Situational, non-routine operation PHEL curves determined by the supervisor**
- **Heat stress monitor provides supervisor with curves to determine stay times**
- **If stack gases affect personnel, reduce stay times (divide by 3)**
- **Round a WBGT of .5 or greater to next highest WBGT (Example: 99.5=100.0)**